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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/372,331	08/11/1999	NIKOLAI NEFEDOV	297-008769-U	1278

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CLARENCE A GREEN
PERMAN & GREEN
425 POST ROAD
FAIRFIELD, CT 06430

EXAMINER
YEH, EDITH M

ART UNIT	PAPER NUMBER
2634	

DATE MAILED: 07/31/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

HG

Office Action Summary	Application No.	Applicant(s)	
	09/372,331	NEFEDOV, NIKOLAI	
	Examiner	Art Unit	
	Edith M Yeh	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on 8/11/99.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-14 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-14 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because it should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. Correction is required. See MPEP § 608.01(b).

2. The disclosure is objected to because of the following informality: On page 8 line 9, the term "Fig.1" is suggested to change to "Fig. 2". Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "nonrecursive intersymbol interference" is unclear; a definite definition of this term is suggested.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 1, 3-5, 10 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentablep over Kobayashi et al. U.S. Patent No. 6029264 in view of Benedetto et al. (Serial Concatenation of Interleaved Codes: Performance Analysis, Design, and Iterative Decoding, IEEE Transactions on Information Theory, Vol. 44, No. 3, May 1998).

Regarding to claims 1 and 10, Kobayashi et al. disclose a concatenated system (Fig.2 and Fig.3) wherein the disclosed transmitter comprising: an outer encoder; an interleaver; a convolutional inner encoder in conjunction the modulator (column 1, lines 50-51 and column 2, lines 8-12), and its method. However, Kabayashi et al. fails to disclose the recursive inner code specificly. Benedetto et al. teach the recursive convolutional code can be used in an inner encoder to yield an interleaver gain (Page 917, right column, 1st bullet). Therefore, it would have been obviously to one of ordinary skill in the art at the time the invention was made to modify Kobayashi et al.'s inner code by Benedetto's teaching to a recursive inner code and a modulator unit as recited in claim 10 and the method of the unit as recited in claim 1 to get interleaver gain.

Regarding to claim 5, Kobayashi et al. disclose an outer code but fail to specify a convolutional code as an outer code in their concatenated encoding and decoding system. However, Benedetto et al. disclose a SCCC with a convolutioal outer code in the Fig.5 of their May 1998 paper as recited in the claim 5. Therefore, the use of Benedetto et al.'s convolutional outer code in Kobayashi et al's outer encoder would have been evident to one of the ordinary skill in the art at the time the invention was made, since it has been taught by Benedetto et al. that the use of convolutional code would have greater interleaver gain and code performance (page 910, 1st column, lines 6-12).

Regarding to claim 3, 4, 12, and 13, Kobayashi et al. teach an inner encoder and modulator as an integrated structure (Fig. 4. and column 5, lines 6-8), and the differential code for modulation (column 3, lines 5-10) to minimize unknown/time-varying channel interference (column 3, lines 12-16). From Kobayashi et al.'s teaching, it has been obviously to a person of ordinary skill in the art at the time the invention was made to have the encoder and modulator in the claims using the differential code in its differential modulation to provide good performance under a wide variety of channel conditions.

Regarding to claim 14, Kobayashi et al. teach the TCM as the integrated structure (Fig.5, column 3, lines 25-35) as recited in claim 14 to have the result of effective error corrections (column 3, lines 29-32). Thus, it would have been obvious to one of the ordinary skill in the art at the time the invention was made to use the Kobayashi et al.' s TCM in which a convolutinal code and modulation are combined in the transmitter to gain optimal coding performance.

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentablep by Kobayashi et al. U.S. Patent No. 6029264 in view of Benedetto et al. (Serial Concatenation of Interleaved Codes: Performance Analysis, Design, and Iterative Decoding, IEEE Transactions on Information Theory, Vol. 44, No. 3, May 1998) further in view of Benedetto et al. (Analysis, Design, and Iterative Decoding of Double Serially Concatenated Codes with Interleavers, IEEE Journal on Selected Areas in Communications, VOL. 16, No. 2, February 1998).

Kobayashi et al. disclose an outer code but fail to list a SCCC as the outer code. However Benedetto et al. reveal that the double serially concatenated convolutional code (DSCCC) structure (page 234, Fig. 4) has better error performance than the SCCC (page 240, Fig.8 and 1st column, lines 5-7). Benedetto et al's DSCCC consists the outer code, interlever in between, and

the middle code (these three are a SCCC compose of), then followed by an interleaver and then an inner code; the first three components of the DSCCC as a SCCC is the outer code with respect to the followed interleaver and inner code. Hence it would have been prima facie obvious to a person of the ordinary skill in the art at the time the invention was made to substitute the Kobayashi et al.'s outer code to a SCCC with Benedetto et al.'s DSCCC teaching to have better error performance.

6. Claims 2 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al. U.S. Patent No. 6029264 in view of Benedetto et al. (Serial Concatenation of Interleaved Codes: Performance Analysis, Design, and Iterative Decoding, IEEE Transactions on Information Theory, Vol. 44, No. 3, May 1998) further in view of Hanzo (Bandwidth-Efficient Wireless Multimedia Communications, Proceedings of the IEEE VOL. 86, NO. 7, July 1998).

Kobayashi et al. reveal that a better permutation module exists than a conventional interleaver (column 6, lines 6-8) but fail to indicate the specific kind of the better interleaver. Hanzo teaches using a range of more random interleaving i.e. pseudorandom interleaving algorithm in the interleaver after the channel encoder to achieve higher performance in his July 1998 paper (page1348, right column, lines 14-17). Thus, it is obvious for one of the ordinary skill in the art at the time the invention was made to deploy the pseudorandom interleaving in the permutation of the Kobayashi's system to get maximal performance.

7. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al. (U.S. Patent 6029264) in view of Valenti et al. (Combined Multiuser Reception and Channel Decoding for TDMA Cellular Systems, IEEE Vehicular Technology Conference, 1998, Vol. 3, pages 1915-1919).

Regarding to the claim 7, Kobayashi et al. disclose the method of transmitting and receiving in steps a) to e) in Fig.2 and Fig.4, and the method of receiving in an iterative manner (Abstract lines 3-4; Fig.7B) to improve error correction (column 4, lines 48-51), but fails to itemize steps f), g), h), and i). Valenti et al. teach the steps f) to i) of claim 7 in their May 1998 paper (page 1917, Figure 1). Valenti et al. teach the following:

a. as recited in step f), producing an estimate of the characteristics of the transmission channel via the channel estimator (Figure1; page 1917, right column, A. Receiver Description, lines 12-15),

b. as recited in step g), converting the received carrier in a SISO equalization process using the channel estimator via SISO Multiuser Detector (Figures 1; page 1916, left column, lines 27-30, right column, A., lines 16-17),

c. as recited in step h), deinterleaving by a deinterleaver (Figure 1), and

d. as recited in step i), decoding the output of the deinterleaver via the SISO Channel Decoder (Figure 1; page 1918, left column, lines 8-11).

Valenti et al's teach these steps to avoid the performance loss and achieve a turbo equalizing/decoding effect to minimize the ISI (page 1917, right column, lines 11-20). Since Kobayashi et al.'s system and Valenti et al's system both are for error correcting, it would have been obvious to a person of the ordinary skill in the art at the time the invention was made to modify Kobayashi et al.'s error correcting system with Valenti et al.'s teaching to have the method recited in the claim 7 to minimize the ISI and gain performance.

Regarding to claim 8, Kobayashi et al. disclose an iterative manner receiving method (Abstract lines 3-4; Fig.7B) but fail to set the number of the iterations. Valenti et al. (page 1917,

Figure 1) teach that a number of iterations of steps g) decoding, h) deinterleaving, and i) decoding as well as reinterleaving between steps i) and g) have the turbo decoding effect (page 1917, right column, lines 11-17) and further more Valenti et al. show the performance results after second iteration and third iteration, are better than the one after first iteration (page 1918, Figure 2, right column, lines 18-23). Hence, it is obvious to one of the ordinary skill in the art at the time the invention was made to modify the Kobayashi et al.'s iterative manner receiving method with Valenti et al.'s SISO iterative decoding method to have the iteration number larger than one as recited in claim 8 to get a better error correction performance.

Regarding to claim 9, Kobayashi et al. teach using the TCM encoding and maximum-likelihood decoding (column 3, lines 25-41) to have effective errors correction (column 3, lines 25-41) but fails to have the SISO equalization process. Valenti et al. teach using the channel estimator and SISO Detector as the SISO equalization process (page 1917, Figure 1) in their SISO decoding modules to have the turbo liked decoding and equalization effect (page 1915, right column, lines 24-26). Hence, it would have been obviously to one of the ordinary skill in the art at the time the invention was made to modify Kobayashi et al.'s receiving method with Valenti et al.'s iterative decoding modules having the SISO equalization process to work over the TCM (combined Trellis of the recursive inner code and modulation) as the encoding method and the channel noise to obtain efficient error correction taught by Valenti et al.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edith Yeh whose telephone number is (703) 305-3416.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin, can be reached at (703) 305-4714.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only) Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

STEPHEN CHIN
SUPERVISORY PATENT EXAMINEF
TECHNOLOGY CENTER 2600